

Claims

1. A device for removing fruit from a plant comprising a vibratory head having means for clamping a fruit plant, and means for controlling the vibratory head, the vibratory head further comprising at least one reaction mass which is vibratably driveable and connected to the clamping means for relative movement therebetween to provide a unidirectional force transmittable between the reaction mass and the clamping means, and hence transmittable to the plant.
2. A device according to claim 1, wherein the control means comprise electronic control means for controlling the frequency and/or phase and/or amplitude of the vibrations.
3. A device according to claim 1 or 2, wherein the or each reaction mass comprises a hydraulic cylinder and/or piston.
4. A device according to claim 3, wherein the hydraulic piston and cylinder are driven by pressurised fluid which is selectively applied to chambers of the hydraulic cylinder by a valve.
5. A device according to any one of the preceding claims, wherein the vibrations of the or each reaction mass are substantially unidirectional.
6. A device according to any one of the preceding claims, wherein the vibratory force is applied to the plant substantially normally to the longitudinal axis of the plant.

7. A device according to any one of the preceding claims, further comprising sensors for measuring the acceleration and/or velocity and/or displacement of the vibrations.
8. A device according to claim 7, wherein the frequency and/or phase and/or amplitude of the vibrations of the reaction mass are adjustable in dependence on the sensor information.
9. A device according to any one of the preceding claims, wherein the control means are manually adjustable.
10. A device according to any one of the preceding claims, wherein the vibrations have amplitude and/or frequency and/or phase which vary with time.
11. A device according to claim 10, wherein the frequency of the vibrations is swept linearly or non-linearly from an initial sweep frequency to a final sweep frequency.
12. A device according to claim 11, wherein the initial sweep frequency is higher than the final sweep frequency.
13. A device according to claim 11, wherein the initial sweep frequency is lower than the final sweep frequency.
14. A device according to any one of claims 10 to 13, wherein the vibrations include a modulation component which has a much lower frequency than the sweep frequency.
15. A device according to any one of claims 10 to 14, wherein the frequency range is limited by a band pass filter.

16. A device according to any of the preceding claims, wherein frequencies which cause leaf detachment from the tree are substantially omitted from the vibrations.
17. A device according to claim 3 or 4, wherein the reaction mass comprises a piston.
18. A device according to claim 3 or 4, wherein the reaction mass comprises a cylinder.
19. A device according to any one of claims 3, 4, 17 or 18, wherein the drive means has two cylinders and two pistons.
20. A device according to any one of claims 3, 4, or 17 to 19, wherein the drive means has more than two pistons and cylinders arranged orthogonally to one another for placement around the trunk or branch and driveable sequentially.
21. A device according to any one of the preceding claims, wherein the vibratory head is mounted on carrying means with respect to which the vibratory head is independently movable.
22. A device according to any one of the preceding claims, wherein the drive means utilises electromagnetic or pneumatic force to oscillate the reaction mass.
23. A method of removing fruit from a plant, comprising firmly clamping the plant with clamping means, at least one reaction mass being movably connected to the clamping means, force being transmittable between the or each reaction mass and the clamping means,

vibratorily driving the or each reaction mass to produce a net unidirectional force which is imparted to the clamping means and thus to the plant.